

# Metatarsal Coalition Complicated by Interdigital Neuroma

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Citation: Yang C, Gould ES, Mason M. Metatarsal coalition complicated by interdigital neuroma. *Radiology Case Reports*. [Online] 2009;4:286.

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Abbreviations: MRI, magnetic resonance imaging

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Published: May 31, 2009

DOI: 10.2484/rcr.v4i2.286

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## Abstract

We present the case of a 20-year-old man with the chief complaint of right foot pain for the past three years presenting with focal bony prominence at dorsomedial aspect of right mid foot with interdigital pain. MRI demonstrated a metatarsal coalition with interdigital neuroma.

## Introduction

Tarsal coalition is common and can be seen in 1-2% of the population. Calcaneonavicular and talocalcaneal articulations are most commonly affected. Other less common type of coalition includes calcaneocuboid, cubonavicular and navicular-cuneiform articulation. Metatarsal coalition is an uncommon type of coalition with few cases reported in the literature. Only coalition between first and second metatarsal bones and fourth and fifth metatarsal bones have been described. Most patients were young adult and typical symptoms include trouble finding suitable foot wear and pain.

## Case Report

20-year-old man presented with increasing pain corresponding to the plantar aspect of the second web (intermetatarsal) space for the past three years. The patient was active in sports, particularly football. His past medical history was notable for the presence of a bony prominence over the dorsomedial aspect of the right mid foot since birth. The patient stated that his father had the same bony prominence at the same location of the same foot. He did not complain of any symptoms related to the “bump” other than minor issues of fitting into shoes. The patient had been seen by a podiatrist, who prescribed orthotics with limited relief of symptoms. The pain increased during exercise. He was referred by podiatry to orthopedic surgery for further evaluation.

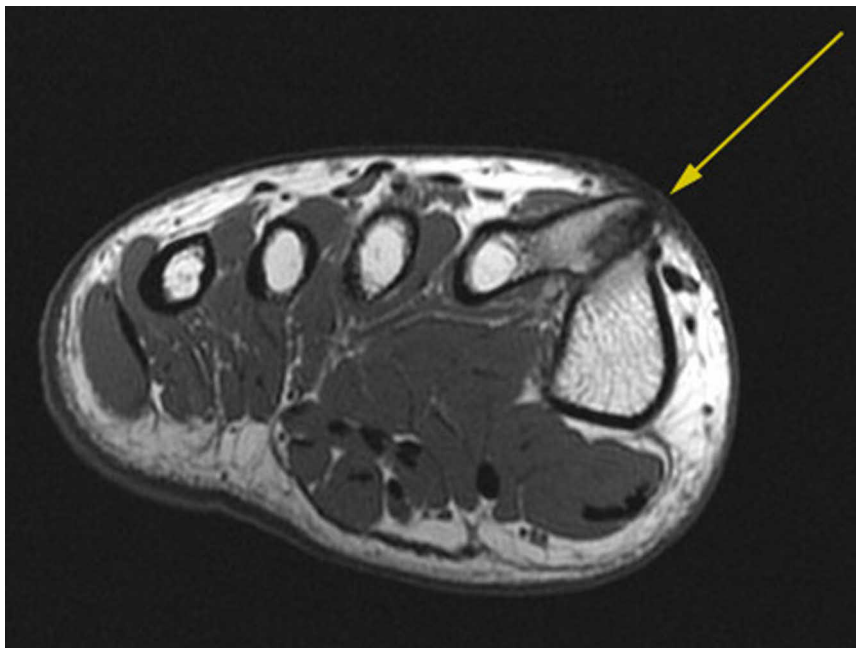
Physical exam was notable for focal bony prominence at the dorsomedial aspect of the right mid foot without tenderness to palpation. The overlying skin was normal in coloration. Patient demonstrated an abnormal gait with persistent minor supination of the right forefoot. During gait, he appeared to bear weight on the second/third metatarsal heads rather than the first. The first web space was noted to be narrowed with the first and second toes in close apposition without syndactyly. The second web space was widened. There was focal tenderness to palpation corresponding to the plantar second web space.

MRI was ordered to exclude an osteochondroma.

Subsequent MRI demonstrated focal bony prominence projecting dorsally from the base of the first and second metatarsal bones in close apposition with typical appearance of non-osseous coalition (Fig. 1). Mild subchondral marrow signal and cystic changes are noted at this articulation. This finding corresponded to the focal bony prominence that the patient stated he had since birth. Fusiform soft tissue is also noted at the plantar aspect of the second web space consistent with interdigital (Morton) neuroma (Fig. 2). This finding explained the patient's chief complaint of plantar foot pain at second web space.



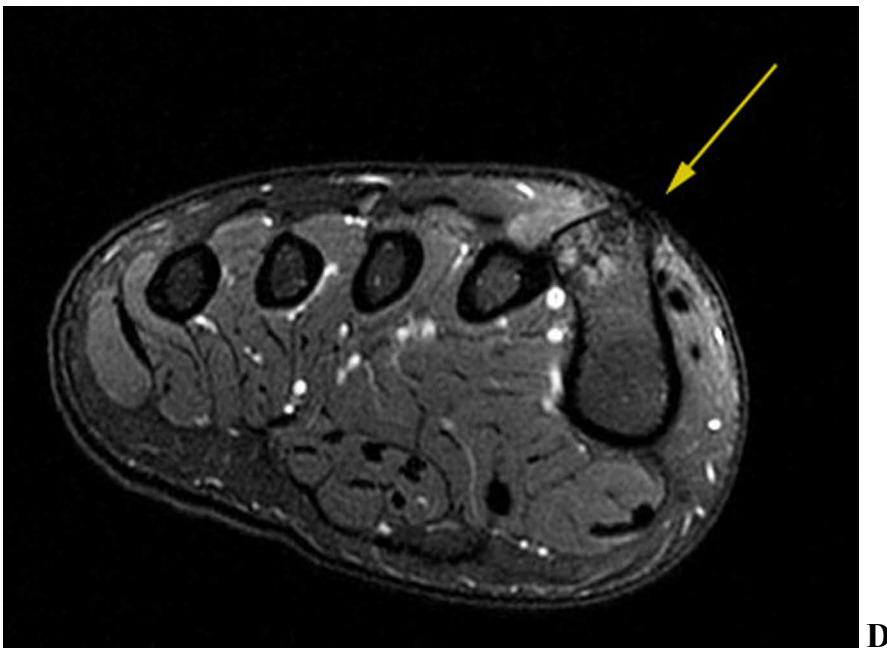
A



**B**



**C**

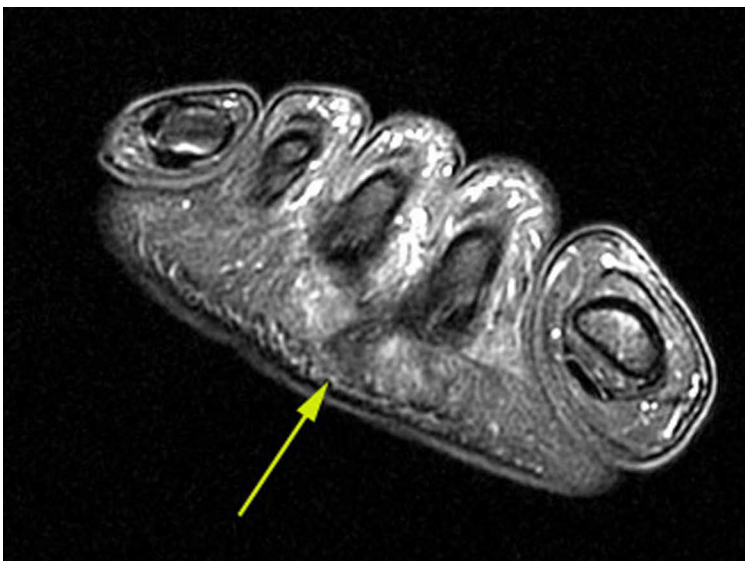


**D**

**Figure 1.** 20-year-old man with metatarsal coalition. **A**, Coronal and **B**, Axial T1-weighted non-fat saturated MRI sequences demonstrating focal bony prominence projecting dorsally from base of the first and second metatarsal bones in close apposition with typical appearance of non-osseous coalition. **C**, Coronal and **D**, Axial T2-weighted fat saturated MRI sequences demonstrating mild subchondral marrow signal changes and cystic changes at this articulation.



**A**



**B**

**Figure 2.** 20-year-old man with metatarsal coalition. **A**, T1 weighted non-fat saturated and **B**, T2 weighted fat-saturated MRI sequences demonstrating fusiform soft tissue mass at the plantar aspect of the second web space consistent with an interdigital neuroma.

## Discussion

Tarsal coalition is a common developmental variant that is present in 1-2% of the population. The most common type of tarsal coalition involves the calcaneonavicular and talocalcaneal articulation, which accounts for over 90% of the cases [1]. Less common coalition includes calcaneocuboid, cubonavicular or navicular-cuneiform articulation [2]. The coalition may be complete or incomplete and can be further divided into bony, cartilaginous, or fibrous (fibrocartilaginous). MRI is useful in distinguishing osseous from non-osseous coalition. Coalitions with varying degree of fibrous and cartilaginous tissues are common and can add to the diagnostic difficulty [3].

Coalition of the metatarsal bones is uncommon relative to tarsal coalition. Most of the reported cases involve coalition between base of fourth and fifth or first and second metatarsal bones [4-6]. Other type of coalition may coexist. Boccio et al. [4] reported a 28 year old male patient with coalition between medial and middle cuneiform, navicular-cuboid and base of fourth and fifth metatarsal bones, whose main complaint was trouble finding suitable shoes. Other reported symptoms include pain at bony prominence or pain with long period of standing [4-6]. As only few cases are reported in the literature, the frequency, sex and age of presentation remain to be determined. In the few reported cases, all of the patients were young adult affecting both male and female patients.

Our patient presented with focal plantar pain attributed to an interdigital neuroma at the plantar second web space. This interdigital neuroma may have developed secondary to chronic pressure on the second and third metatarsal heads due to altered biomechanics. There is abnormal relationship between the metatarsals with mild medial rotation of the first metatarsal bone. At rest, his forefoot is mildly supinated and when he walks, he bears weight abnormally on the second and third metatarsal heads instead of first. Proper weight distribution requires normal relationship between the metatarsal bones [5]. Interestingly, the patient reports that his father has the same bony prominence at the same location and the same foot. The inheritance pattern has been demonstrated for tarsal coalition with autosomal dominant pattern and near full penetrance [7]. The genetics of metatarsal coalition, however, is not known.

Treatment of metatarsal coalition may be conservative or surgical. The goal is to reestablish normal metatarsal relationship with restoration of normal weight bearing dynamics. Surgery may be warranted if there is significant pain, cosmetic deformity, or trouble with shoe wear. Typical surgery involves excision of the coalition [4].

In conclusion, we present an unusual case of a non-osseous coalition between the bases of the first and second metatarsal bones dorsally. While the coalition itself is not painful or symptomatic, patient also has an interdigital neuroma in the plantar second web space presumably due to altered biomechanics resulting from this coalition.

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